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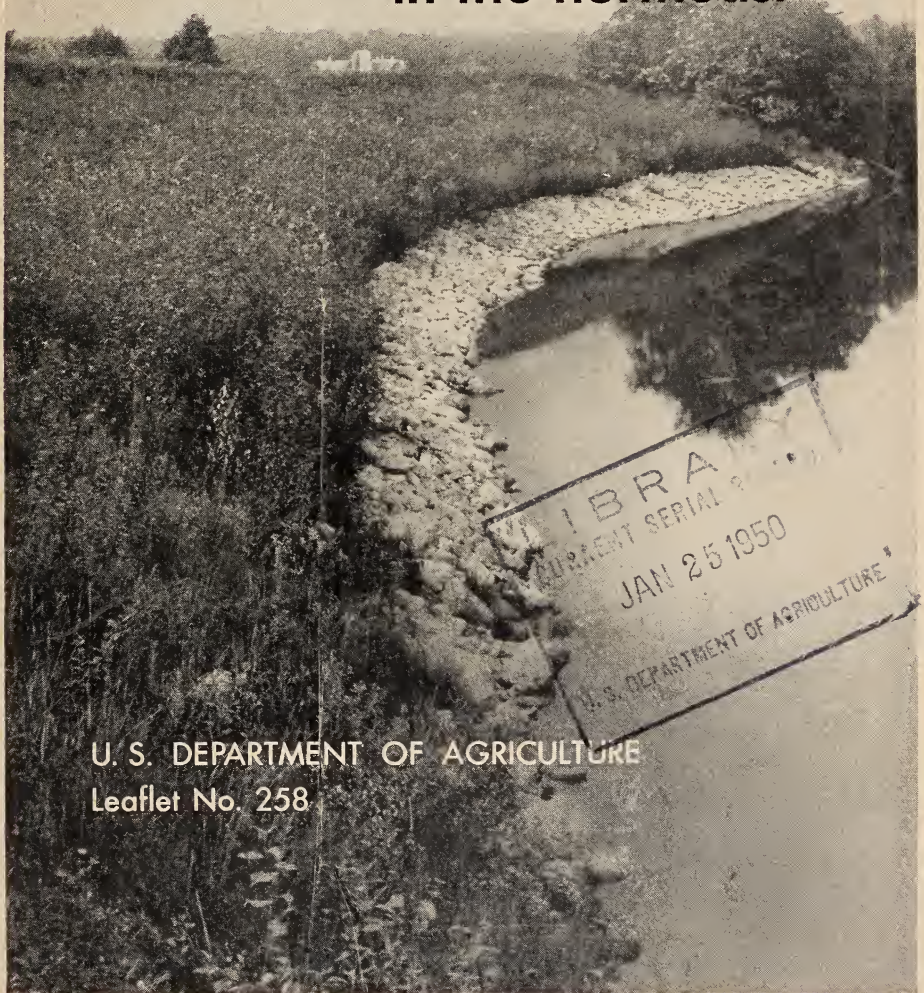
STREAMBANK *Plantings*

. . . for erosion control in the northeast



U. S. DEPARTMENT OF AGRICULTURE
Leaflet No. 258

STREAMBANK PLANTINGS FOR EROSION CONTROL IN THE NORTHEAST

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Every year swift currents tear down the soil of streambanks. Ice and debris carried by high water damage streambanks and adjacent farm land. A good plant cover on the banks would prevent much of this erosion. In many places in the northeastern United States this cover is the only protection needed.

When this protective cover is stripped off, much damage is done. Exposed soil washes into the stream. Productive farm land is carried away as the bank is cut back. The eroded soil chokes the stream channel and the silt and gravel is later deposited downstream, causing the water to spread and flood adjacent fields. This results in serious drainage problems on the farm land.

The silt fills reservoirs along the stream, ending their usefulness. Fish-spawning beds are covered, and the fishing is spoiled. Silt carried far downstream to large waterways impairs navigation and has to be removed by dredging.

Restoring the plant cover on the streambanks greatly helps to improve these waterways. Smaller streambanks may be healed with plantings alone. Many of the larger banks need stone structures in addition. Stone work is costly and often requires public financing and the joint effort of many landowners. This leaflet describes only the treatment of those banks that can be protected with plants. Simple mechanical aids are briefly outlined.

Much streambank erosion is caused when domestic livestock graze the plants and break down the banks by trampling. Destroying the protective plant cover or plowing to the very edge of the bank usually starts erosion (fig. 1). Streambanks damaged by these causes can usually be repaired by methods described in this leaflet.

Kinds of Plants

Farmers can establish and maintain a protective plant cover best by using low-growing woody plants that have resilient stems. Certain shrubs best fit this need. Trees are not suitable (except where

Figure 1.—Plowing the field to the edge of the bank destroys the natural cover of streambanks and exposes the soil to erosion.

the stream flows through woodland) because of their tall and rigid nature. Grasses and grasslike plants are not the best types of plants on banks because they are hard to maintain and most of them are shallow-rooted.

Three kinds of shrubs are adapted for planting on eroding streambanks. The one used to cover all of the bank, except possibly along the water's edge, is a shrub willow called purple-osier willow, which has the scientific name *Salix purpurea.* Dogwood is another good shrub. It thrives a little better at the water line. Either silky dogwood (*Cornus amomum*) or red-osier dogwood (*Cornus stolonifera*) is suitable. Along many streambanks where domestic animals are pastured, another shrub—multiflora rose—will be found useful. Planted in a single row just back of the top of the bank, it forms a living fence that will keep livestock off the banks.

Preparation for Planting

Since willow and dogwood are eaten by domestic livestock, you will probably not have much success growing them on banks where these animals roam. Where a wire fence is used to keep out livestock, the plantings can be made as soon as the fence is built. It takes 3 to 5 years to grow a living fence of multiflora rose. If this kind of fence is used, the planting of the bank must be delayed until the rose plants have made a heavy growth. To succeed, the bank planting has to have some kind of protection from livestock.

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Figure 2.—Steep banks should be graded to a more gentle slope before they are planted. *A,* Bank before sloping. *B,* Same bank a year later after it had been made safe from flood damage by sloping and planting to willows.

In order to make sure that the animals will not get on the bank, you should place wire fences *at least* 6 feet back from the top of any bank that is 4 feet high or less. Add a foot to this distance for every additional foot in the height of the bank. For example, the fence on a bank 5 feet high should be set 7 feet back from the top of the bank. Living fences of multiflora rose should be planted 4 feet from the top of a low bank, and a foot farther back for each foot the bank height exceeds 4 feet. Set the rose seedlings a foot apart in a single row,

preferably in a plowed strip but, in any case, in a plow furrow or desodded strip a foot wide. For more information on living fences of multiflora rose, see United States Department of Agriculture Leaflet 256, Multiflora Rose for Living Fences and Wildlife Cover.

If the stream is needed for watering livestock, openings should be made from the top of the bank to the stream at points where the passing of animals will cause the least damage to the banks. Necessary crossings for the animals may be made at the same place. Crossings should be fenced with wire.

Some banks have been eroded and undercut to a very steep, unplantable slope. You will need to grade such banks before planting (fig. 2). In most soils this slope should be about 1:1, or a foot horizontal for every foot vertical. On light soils, a $1\frac{1}{2}:1$ slope is better. If the amount of work is small, the sloping may be done by hand tools; if considerable, machinery should be used.

Planting Stock

Purple-osier willow is best planted as rooted 1-year-old cuttings, nursery grown. If you cannot obtain these, use fresh hardwood cuttings from old plants (that is, from wood of the previous year's growth). Cuttings and other planting stock should be obtained just before planting. They should be from $\frac{3}{16}$ to $\frac{1}{2}$ inch thick and from 8 to 12 inches long. Poles of purple-osier willow can also be used. Multiflora rose and silky dogwood should be 1-year-old, nursery-grown seedlings. The roots should be at least 8 inches long and the stems should have a diameter of at least $\frac{1}{8}$ inch. Red-osier dogwood may be planted either as 1-year seedlings or as fresh hardwood cuttings.

These cuttings and other plant materials are sometimes available through soil conservation districts. They may also be obtained from commercial nurseries. In some States they can be obtained from the State wildlife or forestry agency. Cuttings are frequently available from mother stock or wild sources near the streambank.

Planting

Seedlings and rooted cuttings are best planted with a mattock or pointed shovel. Fresh cuttings can sometimes be pushed into the soil by hand, leaving only the tip above the ground. If the soil is stony, use a planting bar of $\frac{1}{2}$-inch round steel. Holes should be made just deep enough to hold the whole cutting and should be firmly tamped at the top.

Early spring is the best time for planting. The survival of seedlings which have leaved out is apt to be low. Hence, it is well to finish planting by midspring. Fresh cuttings and poles may be used

Figure 3.—Purple-osier willow is an excellent plant for the main part of the bank. It should be planted with a 2-foot spacing in rows 2 feet apart.

successfully until early summer. Fall planting may be done with success only in sandy or sandy loam soils.

Space the dogwoods and willows 2 feet apart in the rows. The rows should also be 2 feet apart (fig. 3). One row of dogwoods is suggested along the water line, with as many rows of purple-osier willow as are needed to cover the bank. Where willow poles are used, they should preferably be buried in the bank 2 feet apart with the butt ends in the water. If they are laid up against the bank, they may be held tight by staking them with willow cuttings (fig. 4). Where multiflora rose is used at the top, a single row of plants 1 foot apart is best.

Mulching

Newly planted banks are usually bare and subject to further erosion. For at least 2 years, plantings alone cannot effectively prevent further damage. For this reason, a mulch over the bank is advised for temporary protection. Hardwood or evergreen branches are best. The mulch should be placed heaviest on outside curves of the stream where the current strikes the bank. Since high water will float the mulch away, it should be tied down. Old chicken wire and stakes, or No. 9 wire laced between stakes, are suitable for this purpose.

The best mulch material is fresh alder brush cut and placed in early fall when it contains ripe seed. The seeds germinate and help make a living cover. Stakes and branches of purple-osier willow are also

suitable for mulching. The stakes are simply large cuttings that later grow into plants. Tree willows should not be used for stakes, since they must be cut out if they take root.

The amount of mulch needed will depend partly upon the character of the material used. It should be plentiful enough to make a fairly solid mat 6 inches thick when packed.

Mechanical Structures

Some banks are cut mainly by the swiftly running water of the stream. If the bank is undercutting, stone riprap will be needed at the toe of the slope in addition to the vegetation. The cover picture shows a bank that was protected in this way. Heavy, angular stones are best. They should be rough-dumped on the bank after it has been sloped to a natural angle. The riprap should extend 2 feet above the water line of the stream at summer level. The bigger the stones, the better the protection.

The stonework and other needed structures should be designed by competent erosion-control specialists.

Maintenance of Streambank Plantings

Damage is always being done to streambanks, even after much work has been done to stop erosion on them. Repairs will be needed every year or two. Banks should be examined each spring after the high-water period is over. Gaps in the plant cover should be filled at once with new plants or cuttings, and mulched if needed. Frequently the willow cuttings for these repairs can be taken from plants right on the bank.

Trees that may have taken root on the sloped bank should be cut without delay, or pulled if small. All willows that come in on the inside curve of a meandering stream should be cut close to the ground. If this is not done, they are apt to encroach upon the stream and force the current against the steeper outside curve. This causes more erosion.

If the riprap has slid, more stones should be placed. Annual watchfulness will help to prevent loss of work previously done, and will safeguard the banks against further erosion.

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Figure 4.—A, Poles of purple-osier willow placed on the bank with the butts in the water can be used as well as cuttings for revegetation. *B,* The same bank 3 years later.

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